REMARKS

Claims 1-51 remain pending in the application.

The finding of patentable subject matter in claims 1-14, 45 and 50 is noted with appreciation.

The rejection of claims 50 and 51 under § 101 is respectfully traversed. Claim 50 is in Jepson format, with the preamble reciting, *e.g.*, "processing said content data..." - a proper method limitation.

The Action seems to require that the method of attaining the watermark be precisely detailed. However, such is not believed to be a proper requirement. An analogy might be:

> *In a method of milling a piece of lumber that includes processing same with a bandsaw, an improvement wherein the milled lumber has five sides.*

Although the limitation in the "improvement" clause does not define an "act," *per se*, it nonetheless is a proper limitation on the claimed method.

Reconsideration is requested.

Claims 15-24, 27 and 29-40 stand rejected over Cox (5,915,027) in view of the Cox article (*A Secure, Imperceptible yet Perceptually Salient...)* and a patent to Javidi (5,903,648). (The Action included a typographical error; the just-cited basis for rejection was relayed from the Examiner in a telephone conversation on May 10, 2005.)

The rejections are respectfully traversed. As the Examiner correctly noted, neither of the Cox references teaches application of a pseudo-random reversible function as required by the claims.

Javidi is cited to cure this deficiency. However, Javidi relates to a different field of art: *encryption* systems. Claims 15 and 27, in contrast, concern *watermarking* systems (watermarking is a form of steganography).

Encryption and watermarking are related, but different.

Consider a simple letter-substitution *encryption* technique, in which the letter A is replaced with the letter B; the letter B is replaced with the letter C; ... and the letter Z is replaced with the letter A. In such an arrangement, the message "HELLO" would be encoded as "IFMMP." An observer cannot see the *actual information* encoded (i.e.,

HELLO). However, it is evident to such an observer that some information is being represented. This is a common attribute of encryption – it is evident that some information is being conveyed or represented. This is the case with Javidi.

In contrast, watermark systems convey information in such a manner than an observer does not even recognize that hidden information is being conveyed or represented. Consider the word COSIMANO. To the causal observer viewing this document, this looks like nothing more than a name. No other information is apparent. However, the message "1010111" is digitally-watermarked into this name. How? The spacings between the letters C-O, and S-I, and M-A, and A-N, and N-O are a half-point (i.e., about .0069 inches) greater than the spacings between the letters O-S and I-M.[1] The larger spacing represents a binary "1" and the smaller spacing represents a binary "0." So hidden in the name COSIMANO is the digitally-watermarked message 1010111. This is an attribute of digital watermarking (and steganography) – an observer is not alerted that hidden information is being conveyed.

As noted, Javidi relates to encryption, not watermarking. Similarly, the rationales offered in the Action to explain why an artisan would turn to Javidi are also based on encryption, not watermarking. For example:

> *It would have been obvious to a person of ordinary skill in the art to **encrypt** the image as disclosed by Javidi in the system of Cox. One of ordinary skill in the art would have been motivated to do this because the two **encrypting** random phase functions are two independent white sequences uniformly distributed and therefore difficult to **decrypt** the image and the memory without the knowledge of the phase functions used in the **encryption**.*[2]

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[1] This can be confirmed in the original Word version of this document by individually highlighting each letter and then clicking Format/Font/Character Spacing. C, S, M, A and N show that the Character Spacing has been Expanded by 0.5 points.

If the recipient of the document receives it in printed form, rather than in electronic (Word) form, the data may still be extracted by scanning the document and analyzing the character spacing. To assure that the message is reliably communicated in printed documents, a steganographer would typically encode the 1010111 message redundantly, e.g., in the first 7 characters of each line of a document. Additionally, error-correcting bits might be added to the message payload. By such arrangements, the 1010111 message can be conveyed reliability despite imperfections in the printing/scanning process.

[2] January 26, 2005, Action, page 4, lines 5-10 (emphasis added).

Absent the teaching of applicants' specification, the art provides no suggestion of using a pseudo-random reversible function to a block of the digital media data in a digital watermarking method.

Still further, incorporation of Javidi's teachings into the system of Cox would frustrate Cox's intent.

Cox's article and patent both concern hiding data in content *without perceptually degrading the content*, i.e., while preserving the image fidelity.[3]

In contrast, Javidi's teachings lead to image *scrambling*. Compare, for example, Javidi's input images of his Fig. 2, versus his image after processing – shown in Fig. 3.

If the cited teaching from Javidi were employed in Cox, the resulting output image would be totally degraded – with the image fidelity lost.

In view of the foregoing, withdrawal of the rejections based on Javidi in combination with Cox is requested (i.e., claims 15-24, 27 and 29-40).

Claims 26, 41-42 and 46-48 stand rejected over Cox in view of Rhoads (5,822,436)

Claim 26 depends from claim 15, and thus defines a watermark extraction method that includes, e.g., "applying a pseudo-random reversible function." Neither Cox nor Rhoads teaches or suggests such a limitation.

The Action proposes employing Rhoads' subtraction arrangement in the system of Cox. However, the systems' differences make such a hybridization unworkable.

The cited excerpt of Rhoads teaches that a '1' in a given bit position of a watermark payload (message) can be encoded by adding a frame of noise-like data to an image, and a '0' in the same bit position can be encoded by subtracting the same frame of noise-like data from the image. (Other bit positions in this embodiment have different noise frames that are added/subtracted.)

Thus, in the cited Rhoads embodiment, a particular frame of noise data is associated with a particular bit position in a watermark payload. For example, in the

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[3] *See, e.g.,* Cox article at col 1, which notes that prior art approaches "can lead to perceptual degradation of the signal" and proposes his arrangement "to avoid this."

Likewise, Cox's patent notes "The embedded signal should preserve the image fidelity" (col. 1, lines 29-30.

eight bit payload 11001110, one frame of noise data is associated with the least significant bit position (and is subtracted from the image, since that bit has a '0' value), a different frame of noise data is associated with the most significant bit position (and here is added to the image, since that bit has a '1' value), and likewise for all the intervening bit positions.

The Cox arrangement, in contrast, is not understood to associate different frames of noise data with different bit positions. Rather, Cox associates different pseudo noise sequences with different symbols. (*See, e.g.,* col. 4, line 46: "*The output of encoder 10 is provided to a PN-mapper 11, which maps each symbol of the encoded watermark into a pre-specified pseudo-random noise (PN) code.*") In Cox's arrangement, a '0' symbol is represented by a different noise sequence than a '1' symbol.

Adopting Rhoads' cited teaching, in which the same noise sequence is employed to encode both a 1 or a 0 in any given bit position, would entail a wholesale reworking of the principles on which Cox is based – a reworking that is not suggested by the art.

Claim 42 depends from claim 41, and further requires determining an average value of samples within a portion, and then subtracting said average value from each of the samples included in the portion.

Determination of such an average value is not taught by any of the cited art. Thus, it is not believed that any combination of the arts' teaching could yield the claimed arrangement.

Moreover, the rationale offered to support the proposed modification of the art to include the "determining an average value of samples" and "subtracting said average value" is not believed to follow from the references. The Action states that such modification would have been obvious:

> *...because the average value would produce a value that is particular to the data and embedded code signals that carry the bits of information of the identification signal should be unique to each and every encoded signal.*

The undersigned is not sure he fully understands what is meant here. But on its face the rationale seems to be premised on an error, i.e., that "the average value would produce a value that is particular to the data and embedded code signals" and that this

yields a beneficial uniqueness. It will be recognized that a given average value can result from widely disparate inputs (e.g., 49 and 51 average to 50, as does 0 and 100). Thus, no "unique" attribute is understood to follow.

Claims 47 and 48 include limitations similar to those discussed in connection with claims 41 and 42.

Claim 49 is not included in the statement of rejection based on Rhoads and Cox found on page 8 of the Action. However, claim 49 is discussed in this context (page 11). Clarification is solicited.

Claims 25 and 28 stand rejected over Cox and Javidi (as applied to claim 15) and further in view of Rhoads. Such rejections are respectfully traversed, e.g., because obviousness of claim 15 over Cox and Javidi has not been established.

Claims 43-44 stand rejected over Cox in view of Powell (5,721,788).

Claim 43 depends from claim 41, which was rejected over Cox in view of Rhoads. As discussed above, Cox + Rhoads is not believed to render obvious the arrangement of claim 41. Claim 43 – because of its dependency from claim 41 – includes limitations not taught by either Cox or Powell (e.g., those for which Rhoads was earlier cited).

As regards claim 44, the Action states that Powell teaches "the pixel near the point where the watermark is to be inserted are repositioned." No such teaching is understood from Powell. Rather, in Powell, the pixel *value*s are altered at the selected signature points.

The cited Powell excerpt at col. 6, lines 11-17 is not understood to relate to an 'encoding' process, as claimed by claim 44. Rather, this excerpt relates to the problem posed during decoding, if the image has been altered, e.g., if it has been resized to be smaller (col. 6, lines 1-2). In this case, the cited excerpt explains how the image may be normalized to permit decoding to proceed.

For brevity's sake, applicants have not belabored all of the points that might be made concerning the rejections, the claims, and the art. Rather, the foregoing discussion has focused on a few matters which are believed sufficient to establish that the pending claims should be allowed over the art. Action to that end is solicited.

Respectfully submitted,

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